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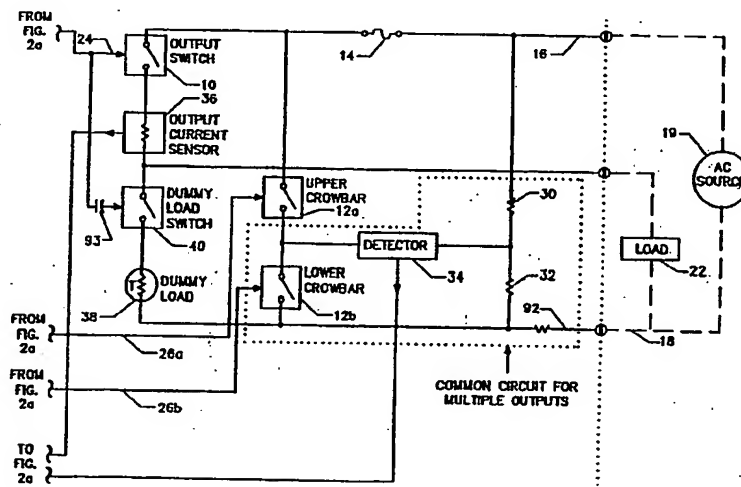
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International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : H02H 3/20	A1	(11) International Publication Number: WO 90/10332 (43) International Publication Date: 7 September 1990 (07.09.90)
<p>(21) International Application Number: PCT/US90/01096</p> <p>(22) International Filing Date: 27 February 1990 (27.02.90)</p> <p>(30) Priority data: 316,172 27 February 1989 (27.02.89) US</p> <p>(71) Applicant: BH-F (TRIPLEX) INC. [US/US]; 20316 Gramercy Place, Torrance, CA 90501 (US).</p> <p>(72) Inventor: MURPHY, Kenneth, J. ; 8028 Masfield Court, West Hills, CA 91304 (US).</p> <p>(74) Agent: HEAL, Noel, F.; 2516 Via Tejon, Suite 316, Palos Verdes Estates, CA 90274 (US).</p>	<p>(81) Designated States: AT (European patent), AU, BE (European patent), BR, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent).</p> <p>Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</p>	

(54) Title: FAIL-SAFE AND FAULT-TOLERANT ALTERNATING CURRENT OUTPUT CIRCUIT



(57) Abstract

A protected digital output circuit coupled to a programmable controller, for controlling a load (22) supplied through alternating-current (ac) power lines, including a fuse (14) and a single controlled output switch (10) connected in series with the load, and a pair of series-connected crowbar switches (12a, 12b) connected together across the ac power lines. The crowbar switches can be commanded closed together in the event that the output switch is commanded open but fails to open, thereby shorting the ac power lines and disconnecting the load by blowing the fuse. In routine diagnostic testing, the crowbar switches can be commanded closed separately to check their operation without blowing the fuse. A current detection circuit is used to check for current in the closed crowbar switch. A current sensor (36) is also used to detect current through the output switch, when commanded closed for switching the load on, or for diagnostic turn-on testing when the load is disconnected.

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